

REMARKS

Claims 1-15 are pending in the present application.

The rejection of Claims 1-15 under 35 U.S.C. §103(a) over Hwang et al in view of Abe et al, Ishii et al, and Murao et al is respectfully traversed.

In the Office Action mailed June 29, 2009, the Examiner continues to allege that the invention is obvious over the combined disclosures of Hwang et al, Abe et al, Ishii et al, and Murao et al. Applicants respectfully disagree.

Each of the methods of the presently claimed invention include the following required step "polymerizing monomers containing the acrylamide wherein the temperature for polymerization ranges from 10 to 90°C". On page 3 of the Office Action mailed November 9, 2009, the Examiner alleges that Hwang et al disclose a polymerization temperature of 10°C.

Applicants respectfully submit that it appears that the Examiner has misunderstood the disclosure of Hwang et al. Specifically, Hwang et al disclose polymerization of acrylamide in the presence of a crosslinker and cells to immobilize the cells into polyacrylamide. The temperature of *this* polymerization is set at 10°C in order to avoid thermal deactivation of the enzyme and/or to avoid killing the cells. Thus, Hwang et al do not disclose polymerizing monomers containing the acrylamide wherein the temperature for polymerization ranges from 10 to 90°C as required in the claimed invention.

Also on page 3 of the Office Action mailed November 9, 2009, the Examiner alleges that, based on the disclosure therein, the acrylamide disclosed by Hwang et al would be a white powder or colorless solution. Not only does the Examiner fail to provide any support for this allegation, this allegation is without merit. The Examiner is reminded that Hwang et

al disclose the use of a crosslinker and cells. Accordingly, the acrylamide polymer disclosed by Hwang et al would not be white or colorless, but would be expected to be brown.

Moreover, Hwang et al disclose the polymerization of acrylamide monomers prepared by hydrating acrylonitrile by using a nitrile hydratase. However, as recognized by the Examiner, Hwang et al does not disclose or suggest the content of oxazole and hydrogen cyanide in the acrylonitrile starting material (page 3, fifth paragraph of the Office Action mailed November 9, 2009).

The Examiner alleges that Abe et al, Ishii et al, and Murao et al compensate for these deficiencies. Specifically, the Examiner alleges that Abe et al provide a disclosure of reducing the oxazole content to the concentration range as claimed and Ishii et al provide a disclosure of reducing the hydrogen cyanide content to the concentration range as claimed. Murao et al is further cited as allegedly disclosing that the reaction is carried out until the concentration of acrylamide reaches at least 30% by mass or more. Applicants again disagree with these allegations by the Examiner, as well as the asserted obviousness based on these allegations, for the reasons already well-established on the record.

Regardless, Applicants again submit that the claimed methods specify that the step of polymerizing monomers containing the acrylamide is at a temperature ranging from 10 to 90°C. None of the cited references, including Hwang et al (see above), disclose or suggest the importance of this polymerization temperature and/or disclose or suggest the improvement in the quality of the acrylamide polymer, particularly in terms of color. Applicants refer to Example 1 of the present application where the polymerization temperature ranges from 10 to 74°C and clearly establishes the benefits of the claimed invention, especially when considering the other well-established differences between the claimed invention and the cited art.

To this end, Applicants again provide the following deficiencies in the disclosures of Abe et al, Ishii et al, and Murao et al to which Applicants adhere:

Abe et al - Abe et al is not an enzymatic process but rather catalytic hydration with water in the presence of a copper-based catalyst (see document throughout, for example, at column 1, lines 6-8 and the Examples).

Murao et al - Murao et al appear to disclose and exemplify the conversion of acrylonitrile to acrylamide by enzymatic hydration (i.e., by using a nitrile hydratase). However, this reference fails to disclose or suggest the oxazole and/or hydrogen cyanide content in the acrylonitrile starting material. Indeed, as we previously argued, it appears that the expectation would be that the oxazole and hydrogen cyanide content in Murao et al would exceed the claimed ranges as this reference utilizes nothing more than commercially available acrylonitrile. Murao et al also fails to disclose or suggest the polymerization step of Claim 1

Ishii et al - Ishii et al suffer from the same deficiencies as Murao et al. Specifically, Ishii et al do not disclose or suggest the content of oxazole and hydrogen cyanide in the acrylonitrile starting material. Further, Ishii et al do not disclose or suggest the polymerization step of Claim 1.

In summary, the only process that provides any disclosure of the oxazole concentration is Abe et al, which does not relate to an enzymatic process as claimed or as disclosed in Hwang et al. The Examiner disregards this difference alleging at the bottom of page 4 of the Office Action that “both Application and Abe teach that oxazole does not participate in the polymerization process, but contributes to water insoluble unreacted monomer... affecting color (Spec) and toxicity (Abe) of the polymer”.

With respect to the remainder of the deficiencies in the cited disclosures, Applicants submit that the skilled artisan would not find the requisite motivation to make the various

changes in the disclosure of Hwang et al based on the disclosures of Abe et al, Ishii et al, and Murao et al to arrive at the expected result of the present invention. Indeed, Applicants submit that none of these references disclose or suggest the importance of maintaining the polymerization temperature ranging from 10 to 90°C and/or disclose or suggest the improvement in the quality of the acrylamide polymer, particularly in terms of color.

The Examiner is reminded that Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. “The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims... In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.” *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

The feature illustrated in the response filed September 29, 2009, and again below, and the unexpected results achieved thereby relates to the polymerization temperature. In the Office Action mailed November 9, 2009, the Examiner makes no attempt to address this limitation in the context of the evidence of record. The Examiner is reminded that all the limitations of the claims must be given their due consideration not just those limitations that the Examiner feels he can disregard or show are in the art. In context, when considering the fact that the evidence of record is sufficient to rebut even a *prima facie* case of obviousness, it is imperative that the Examiner consider the polymerization temperature limitation not just the concentrations of oxazole and hydrogen cyanide.

Applicants again point to the results set forth in Table 1 on page 13 of the specification and submit that these data provide evidence of the criticality of the claimed values and further illustrate the importance of the polymerization temperature (e.g., Example

1 ranges from 10 to 74°C) and clearly establishes the benefits of the claimed invention, especially when considering the other well-established differences between the claimed invention and the cited art.

For the Examiner's convenience, Table 1 on page 13 of the specification, is again reproduced below:

	Acrylonitrile Used		Polymer Aqueous Solution		Color of Polymer Powder
	Oxazole Concentration [mg/kg]	Hydrogen Cyanide Concentration [mg/kg]	1% Salt Viscosity [mPa·s]	Solubility	
Example 1	≤5	0.7	3600	+	+
Comparative Example 1	10	0.7	3620	—	±
Comparative Example 2	10	5	3550	—	—
Comparative Example 3	≤5	5	3580	—	±

Solubility: +: Almost no gelatinous substance; —: Gelatinous substance observed  
 Color: +: White; ±: Slightly yellow; —: Yellow

Applicants again submit that these data show the criticality of the claimed oxazole and hydrogen cyanide content in the acrylonitrile starting material. In particular, Example 1 and Comparative Example 3, support a conclusion of criticality. Specifically, although the only difference between Example 1 and Comparative Example 3 is the concentration of hydrogen cyanide, Example 1 shows improvement in the solubility of polymer aqueous solution and the color of the polymer powder. Heretofore, it was known that hydrogen cyanide contained in acrylonitrile is a catalytic poison. However, the skilled artisan would not know that the concentration of hydrogen cyanide in acrylonitrile affects the quality of acrylamide polymers. Therefore, the results set forth in Table 1 on page 13 of the

specification are unexpected. And, as such, the combination of Hwang et al, Abe et al, Ishii et al, and Murao et al do not support an obviousness rejection.

In the outstanding Office Action, the Examiner again appears to be attempting to disregard the evidence of record as not being a comparison to the closest prior art. Whereas in the past, the Examiner appeared to be only willing to consider data where Applicants presented a comparison, essentially, to itself. Of course, this position is contrary to the standard established by *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979), where Applicants must compare the claimed subject matter with the closest prior art to be effective to rebut a *prima facie* case of obviousness.

Now, the Examiner “changes” the target of what he considers to be a sufficient comparison, or at least rephrases it, providing at the bottom of page 7 of the Office Action mailed November 9, 2009, a new comparison that is created only when the present application is used as a guidepost to pick-and-choose limitations from the disclosures of Ishii et al, Abe et al, and Hwang et al. In essence, the Examiner is once again asking Applicants to compare their invention to what can only be ascertained from their own disclosure. Once again, although evidence of unexpected results must compare the claimed invention with the closest prior art, applicant is not required to compare the claimed invention with subject matter that does not exist in the prior art. *In re Geiger*, 815 F.2d 686, 689, 2 USPQ2d 1276, 1279 (Fed. Cir. 1987) & *In re Chapman*, 357 F.2d 418, 148 USPQ 711 (CCPA 1966) Simply put, the comparison the Examiner is asking for does not exist in the “prior art”. Instead, the comparison that the Examiner is asking for is only present in the context of the present application provided that, for the reasons given above, the artisan make further modifications without provocation and/or motivation to arrive a reasonable approximation of the claimed invention.

In this case, the most relevant comparison is (a) Example 1 of the present application where the oxazole and hydrogen cyanide concentrations are below the claimed threshold values versus (b) a corresponding sample where both the oxazole and hydrogen cyanide concentrations exceed the claimed threshold values. This comparison has already been given as Example 1 vs. Comparative Example 2. Thus, Applicants have sufficiently complied with their requirement to provide a sufficient comparative example demonstrating the criticality of the claimed invention.

Further, Applicants have already established the criticality of the claimed concentrations for the present invention across the entire claimed range. However, Applicants remind the Examiner that unless there is reason to doubt the objective truth of the statements contained in the specification, the specification is to be taken as enabling for the full scope of the corresponding claims. See also *In re Armbruster*, 512 F.2d 676; *In re Angstadt*, 537 F.2d at 503-504; and *In re Vaeck*, 947 F.2d at 495. Teaching in specification is taken as true unless there is reason for doubt. Since the specification states that the results illustrated in Example 1 flow through the entire scope of the claimed invention, this result is taken as true unless the Examiner provides some reason for doubt, which has not happened.

Finally, the Examiner offers no support for this allegation and in no way provides any reason to doubt and/or disregard the relevance of the evidence provided to demonstrate the criticality of the claimed oxazole and hydrogen cyanide content in the acrylonitrile starting material.

Therefore, the results set forth in Table 1 on page 13 of the specification are unexpected. And, as such, the combination of Hwang et al, Abe et al, Ishii et al, and Murao et al do not support an obviousness rejection.

In view of the foregoing, withdrawal of this ground of rejection is requested.

Applicants submit that the present application is now in condition for allowance.

Early notification of such action is earnestly solicited.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read 'V. Shier', with a stylized flourish at the end.

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